



# **Defense Research and Engineering: *Developing Transformation for the Future***

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**February 27, 2004**



# Agenda

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- **Critical Operational Goals**
- **Transformational Initiatives**
  - **National Aerospace Initiative**
  - **Energy and Power Technologies**
  - **Surveillance & Knowledge Systems**
- **Combating Terrorism Technology Task Force (CTTTF)**
- **Summary**

# **Quadrennial Defense Review**

## ***--Critical Operational Goals--***

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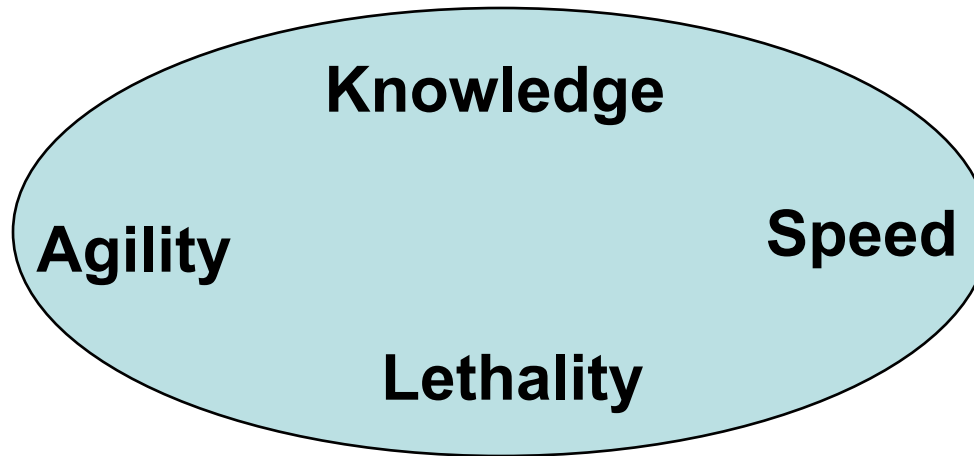


- **Protect Bases of Operations**
- **Deny Enemy Sanctuary**
- **Conduct Information Operations**
- **Project and Sustain US Forces**
- **Conduct Space Operations**
- **Leverage Information Technologies**

# Transformation Technology Initiatives

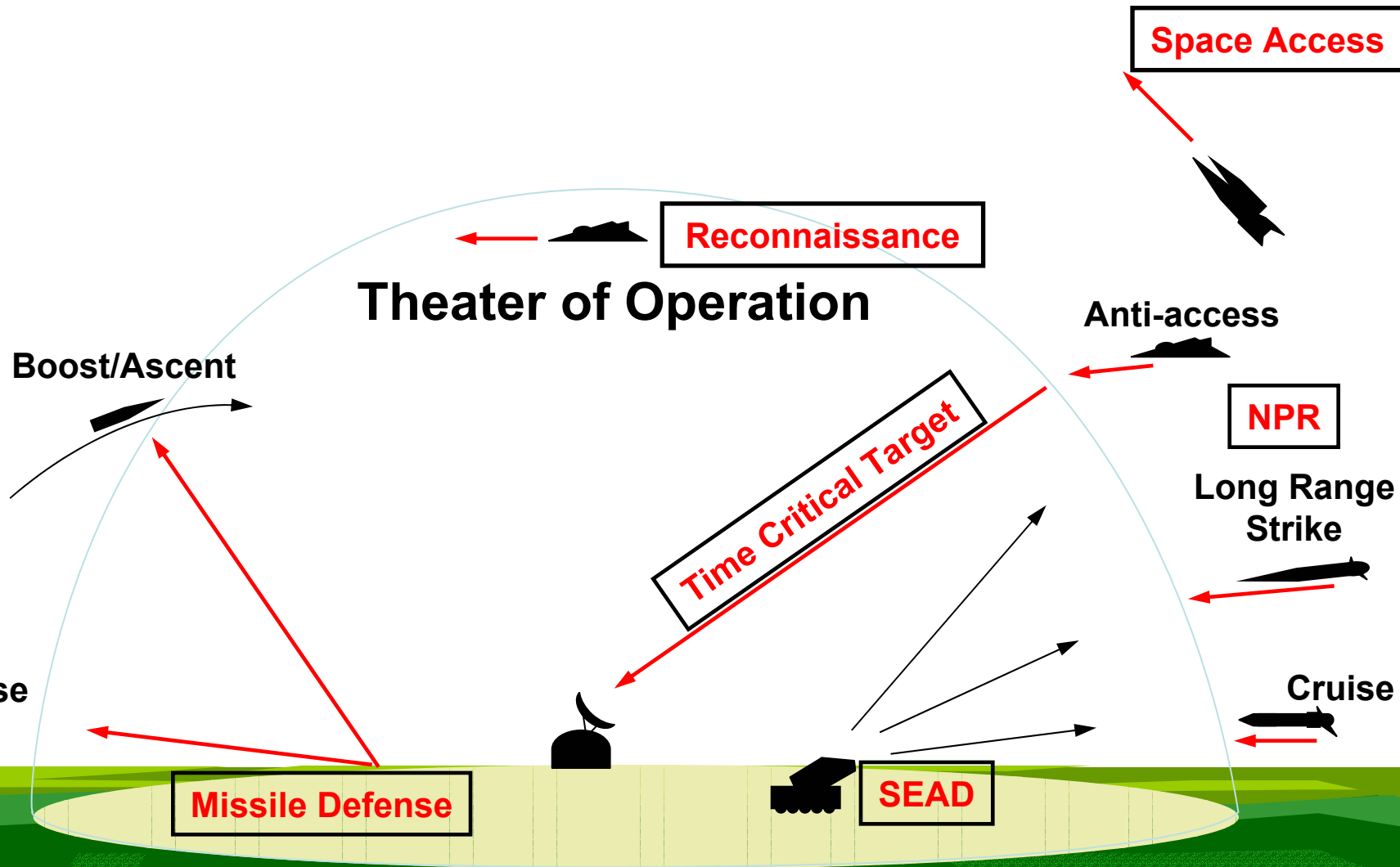


- **Transformation Attributes**



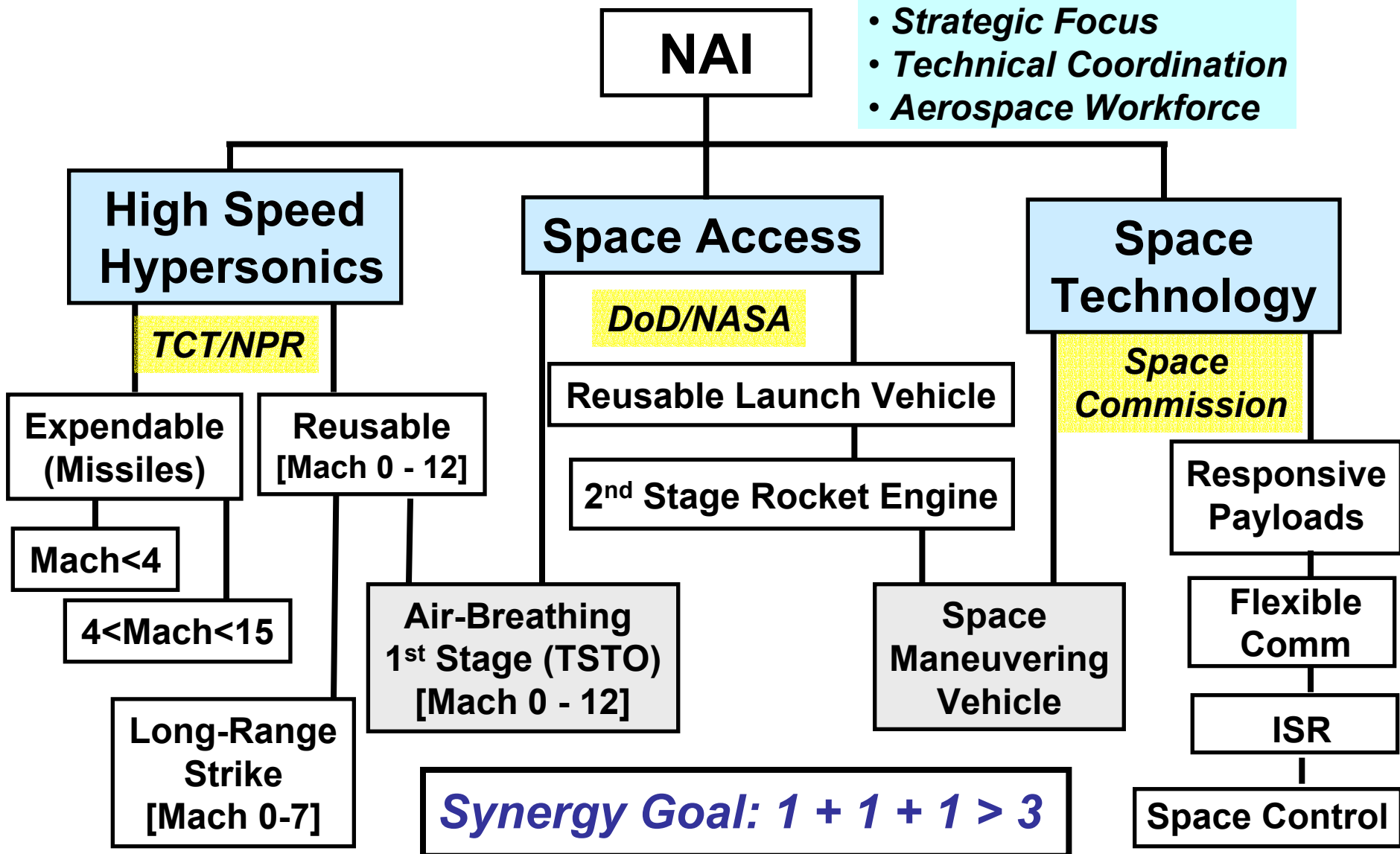
- **Transformation Technology Initiatives**
  - National Aerospace Initiative
  - Energy and Power Technologies
  - Surveillance and Knowledge Systems

# Value of Speed



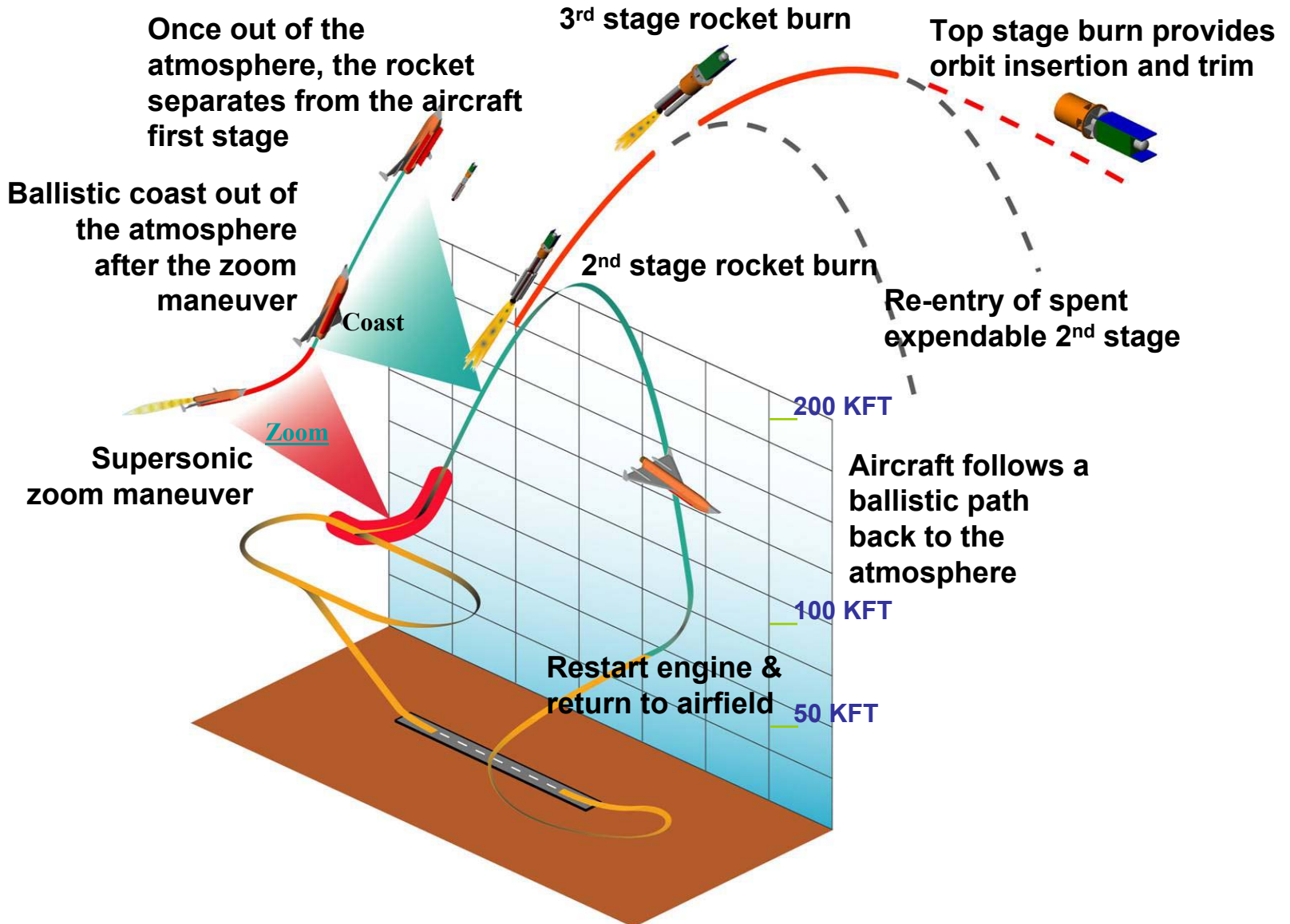
# National Aerospace Initiative

## -- Technology Framework --



# DARPA RASCAL Program

-- High Speed / Hypersonics, Space Access, Space Technology --



# Energy & Power Technologies...

## *Enabling a More Electric Force*



**POWER GENERATION**

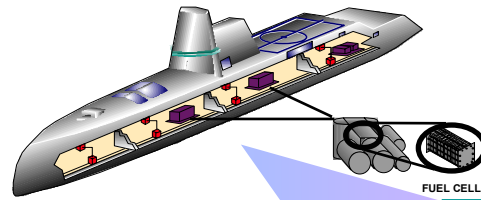
- Fuel Cells & Fuel Reforming
- Novel Power

**ENERGY STORAGE**

- Batteries
- Capacitors

**POWER CONTROL AND DISTRIBUTION**

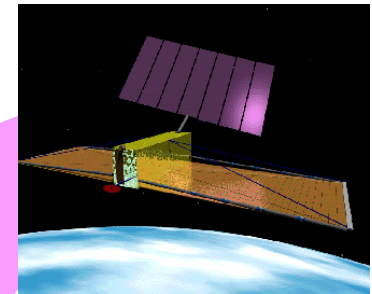
- Switching & Conditioning
- Power Transmission & Distribution
- Thermal Management



*Electric Warship*

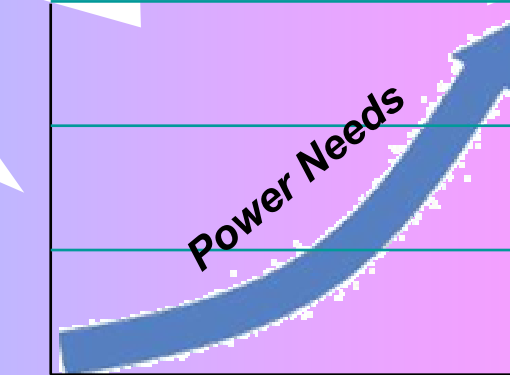
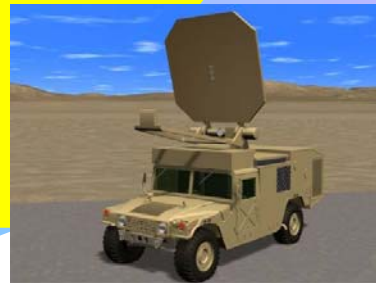


*More Electric Aircraft*



*Space Based Radar*

*High Power Microwave*



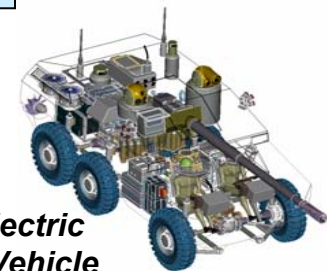
***New Operational Capabilities***



*Warrior*



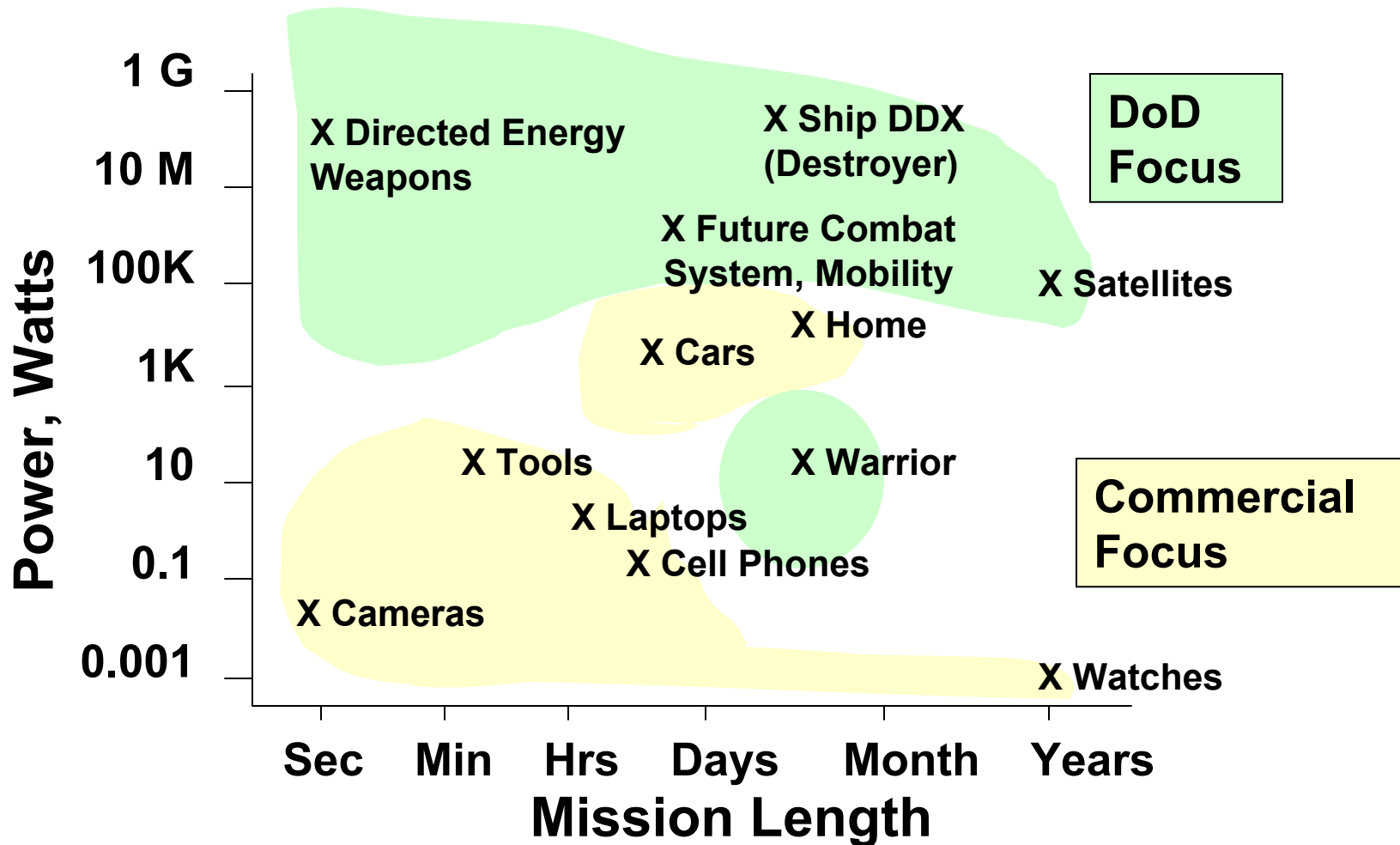
*Electric/Hybrid Weapons*



*Hybrid/Electric Combat Vehicle*



# Energy and Power Technologies



# Surveillance and Knowledge Systems



**Information and Decision Dominance achieved through integrated C4ISR technologies that enable seamless, interoperable, knowledge-based, and assured Joint & Coalition Network-Centric Operations & Warfare.**

- **Sensing:**

Management and tasking of pervasive, persistent sensors for enhancing battlespace knowledge

- **Comms & Networking:**

Guaranteed, 365x24x7, mobile, information access and delivery (always-on “internet dial tone”)

- **Knowledge Management:**

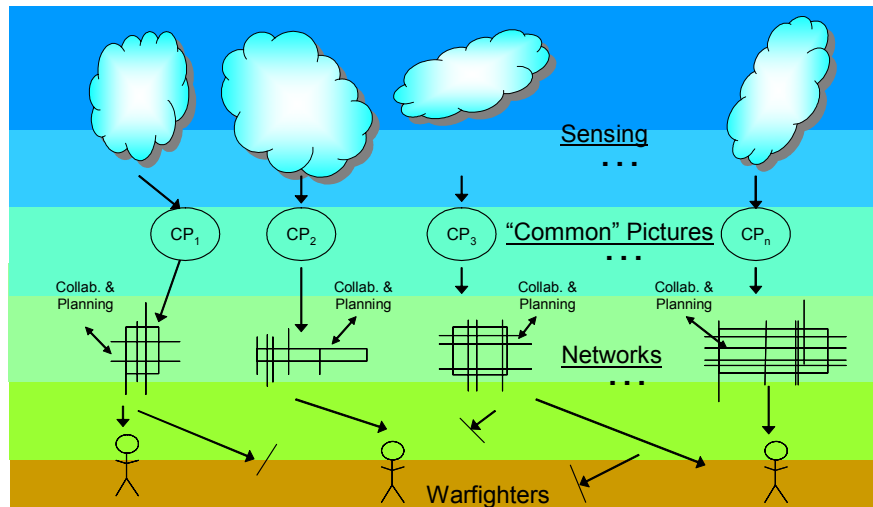
Dramatically improved speed of command through integrated Common Picture, Collaboration, and Planning

- **Information Security (Cyber Ops):**

Network protection, information assurance; offensive disruption

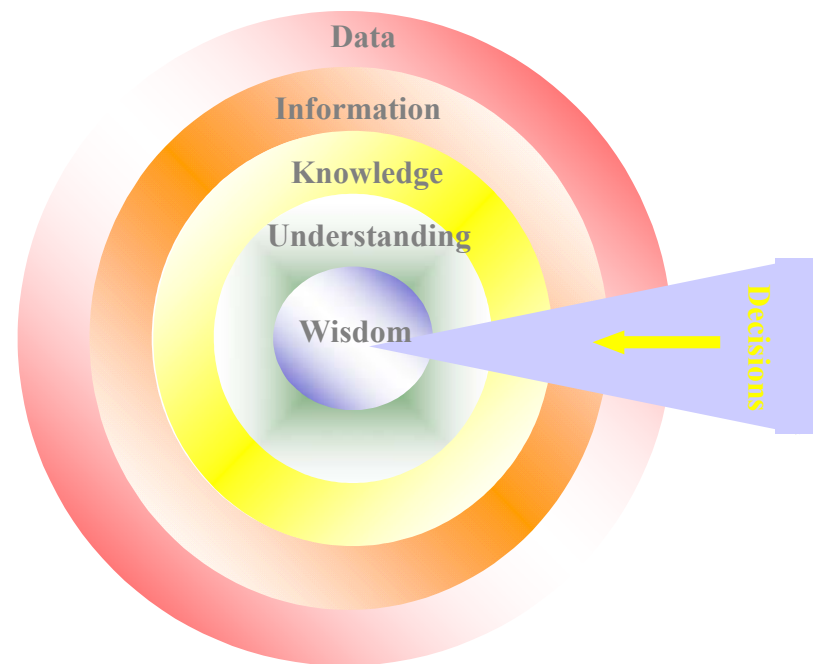
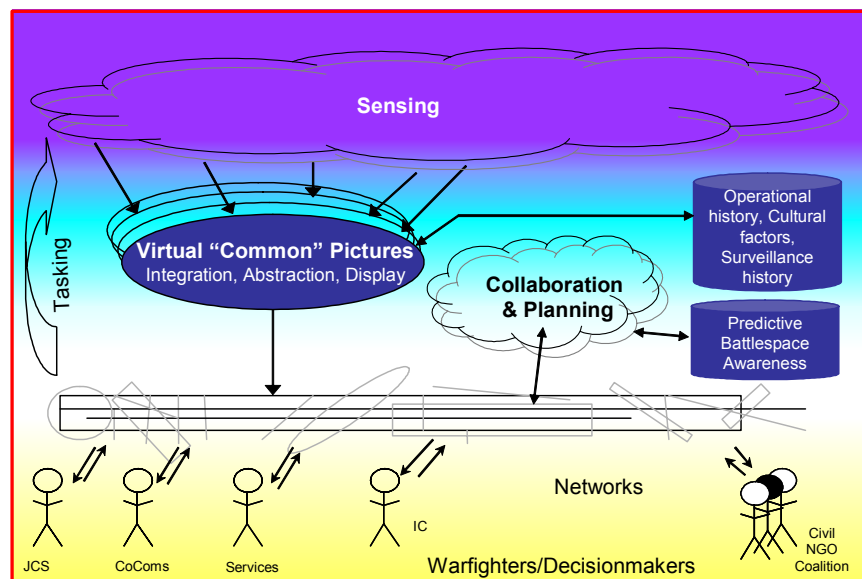
# Surveillance and Knowledge

## *Enabling Integrated C4ISR*



### Technology Foci

- Adaptive Networks
- Ubiquitous Sensors
- Decision Aids



# **Surveillance & Knowledge Metrics:**

## ***Key Elements***



- **Sensing, Detection, & Tracking Effectiveness**
- **Common Picture Quality**
- **Decision Quality & Timeliness**
- **Network Coverage**
- **Interoperability & Flexibility**
- **Information Security, Survivability, and Response**

**There is no single “Mach Number”  
metric to gauge success in C4ISR.**

# DoD Combating Terrorism Technology Task Force (CTTTF)



- ***Task Force Established by DDR&E - Sept 19, 2001***
- ***Collaborative effort between DoD Service/Agency Science & Technology (S&T) Organizations, coordinating with:***
  - **Joint Staff**
  - **Combatant Commanders (CoComs)**
  - **Other Federal Agencies**
- ***Objectives:***
  - **Identify needs and technologies for the Global War on Terrorism (GWOT)**
  - **Prioritize technology options with users**
  - **Rapidly transition and field systems**
  - **Coordinate Force Protection technology solutions**



# Dragon Eye (DE)-ATR

## *(Chem-Bio-Video Advanced Tactical Recce)*

*DE-ATR with CBRV Nose cone (Insert)*



### *Description:*

- Visual Battle Damage Assessment (BDA)
- Real time chemical agent detection and data transmission to ground station
- Collection of biological agents
- Ground-based bioagent analysis 30 - 45 min

### *Capability Characteristics:*

- Altitude: 50-1000 ft AGL
- Range: ~50 min at 40 kt
- Multiple Sites per Mission: Yes
- Comms: Ground Station
- Military / Civilian Operators: Military
- Systems required: 1/mission, reusable, multiple-type payloads
- Detects Multiple Agents

### *Milestones / Schedule:*

- 8 DE-ATR Integration: 2 May 03
- 30 payload / nose cones: 2 May 03
- Testing at NTS with J-39 & ATSD(NCB): Jun 03

*Deployed in Operation Iraqi Freedom*



# Summary

- **A robust, integrated, capabilities-based research and engineering program is vital to transforming the force in support of the QDR's operational goals**
- **Cross-Cutting Initiatives established**
  - **National Aerospace Initiative is an integrated, national approach to sustain American leadership in aerospace**
  - **Energy & Power Technologies is working to revolutionize energy and power components for high impact and accelerated fielding of critical military platforms and weapons**
  - **Surveillance and Knowledge Systems initiative is enabling integrated C4ISR**
- **CTTTF identifies technology to measurably improve the nation's ability to combat terrorism across the spectrum from prevention to protection to response.**
- **DoD R&E is accelerating the transition of technology into operational capability**
- **Science & Engineering Workforce is critical for transformation**